REMARKS/ARGUMENTS

Claims 1, 3, 5-16 and 21-26 are in the application. Claims 5, 11, 21, 24, 25 and 26 have been cancelled. Claims 1, 7, 12, 15, 22 and 23 are amended. New claims 27-28 have been added. No new claim fees are believed required.

1. Amendments to the Claims

The Claims have been amended to more particularly describe and distinctly claim the invention.

Claim 1 is amended to limit the invention to reducing metal oxide corrosion on a supperalloy component of a gas turbine engine, and to specify that the H_3^+ plasma is formed from a plasma-forming gas comprising hydrogen. Support is found at page 4 line 15, and at page 4 line 27, respectively.

Claim 6 is amended to provide a vacuum of at least 10 torr. Support is found at page 5 line 17.

Claims 7, 9 and 12 are amended to correct antecedent basis.

Claim 15 is amended to limit the invention to reducing metal oxide corrosion on a superalloy component of a gas turbine engine, to specify that the electrode is electrically isolated from the discharge nozzle, and to specify that the plasma-forming gas comprises hydrogen and an inert gas. Support if found at page 4 line 15, page 6 line 17, and page 10 lines 24-25.

Claims 22 and 23 are amended to correct dependencies.

New Claims 27 and 28 are added to further limit the vacuum conditions of claims 15 and 23. Support is found at page 5 line 17.

No new matter has been added.

2. Rejections under 35 USC 112

The Examiner rejects Claims 15 and 16 under 35 USC 112, 2nd paragraph as indefinite because the meaning of "non-contacting relation" is unclear. Claim 15 has been amended to provide an electrode that is "electrically isolated from" the discharge nozzle of the plasma torch. Applicants request reconsideration and withdrawal of the rejection in view of the amendments made.

3. Rejections under 35 USC 103

a. Rejection of Claims 1, 5-11, 13, 15-16 and 21-26 over Dopper in view of Wulff

The Examiner rejects Claims 1, 5-11, 13, 15-16 and 21-26 as being unpatentable over Dopper (US2001/0055653) in view of Wulff (US 3,852,061). The Examiner states that Dopper teaches a method of removing oxide from a gas turbine blade 1 by directing a plasma 21 towards the substrate surface, as illustrated in Fig. 4 (paragraphs 11, 20, 55-57).

In reference to an alloy surface, paragraph 42 is referred; to Claim 5, paragraph 56 is referred; to Claim 7, paragraphs 25, 54 and 56-57 are referred; to Claims 9-10, Fig. 4 is referred; and to Claims 13 and 16, paragraphs 38 and 55 are referred. The rejection goes on to state that Dopper teaches removing oxides, but that it would be obvious to remove metal oxides, and that the use of a plasma to remove metal oxides is notoriously well known.

The Examiner then states that Dopper teaches the invention as claimed with the exception of the low pressure within the chamber and apparatus limitations are recited in Claims 11 and 15. The Examiner recites: "Wulff teaches a vacuum plasma apparatus as illustrated in Fig. 1, which is used for reduction of metal oxides (col. 1, lines 5-10). Fig. 1 teaches a discharge nozzle 22b, a plasma source (col. 5, lines1-5), electrodes 16, 18, and a power supply (col. 4, lines 55-60) for generating an arc discharge of ionized gas (col. 5, lines 1-5) used for reducing metal oxides. In reference to the pressure of the vacuum chamber, refer to col. 5, lines 1-5. It would have been obvious to a person of ordinary skill in the art to have modified the method of Dopper to include the plasma of Wulff, for purposes of performing the same function of reducing metal oxides on the substrate surface. In reference to claims 6, 8, 15, and 21-26, Wulff teaches between about 1 and 10 torr. In reference to claim 11, refer to Fig. 1 of Wulff."

The Examiner agrees that Dopper in view of Wulff fails to teach generating a meta-stable H_3^+ plasma, but that both references teach removal and reduction of metal oxide by generating a plasma using hydrogen. He states that Wulff teaches pressure of 1-10 torr. He concludes that "one would have reasonably expected the generation of meta-stable H_3^+ plasma since Wulff uses the same pressure conditions as the instant claimed invention", and that an "H_3^+ plasma (is) formed since the ionization of hydrogen gas would result in various species of hydrogen being formed, one of which being H_3^+ plasma."

Applicants respectfully request reconsideration of the rejection in view of the amended claims and the arguments that follow.

Dopper is concerned with the preparation of a metal surface for application of a thermal barrier coating, by cleaning the metal surface to effect good adhesion between the coating and the metal article (see Dopper, paragraph 0005). Dopper discloses a main, preferred embodiment wherein the cleaning plasma is generated using an inert gas, such as argon. Dopper does not teach the pressure and other conditions necessary and sufficient to form the meta-stable plasma, stating only that a "suitable sub-atmospheric pressure (vacuum) can be established in the chamber" (paragraph 0054). As an alternative, a reactive gas, namely hydrogen, can be used to form the plasma (end of paragraph 0020). Dopper mentions a use of hydrogen to remove an oxide, but does not disclose removal of metal oxide corrosion. Such corrosion results from the build up of metal oxides on a surface of the alloy component of a gas turbine engine, due to the harsh oxidizing environment of the gas turbine engine during commercial aircraft operation.

Wulff relates to a metal melting process for recovering pure molten metal from a powdered metal oxide starting material, typically a powder of up to 100 microns (col. 3, lines 37-41). A tubular, rotating (cyclone-like) plasma field is generated by igniting a desired gas between high-intensity, spaced-apart electrodes (16 and 18) in a magnetic field B formed by a magnetic coil 30. The powdered metal oxide is released into the axial center of the rotating plasma field, and then accelerated radially outwardly through the rotating plasma, to reduce the metal oxide powder to a pure metal that deposits in a layer 36 on the inside wall. Wulff uses the high power of the electrical field (600 kW power) to generate the reductive field to enable the utility of the process with either air or inert gas, neither of which is capable of forming a meta-stable H_3^+ plasma.

It is known to persons skilled in this art that hydrogen gas can form a variety of reactive plasma environments, at a wide variety of conditions of temperature, pressure and concentration. A typical reducing plasma formed from hydrogen gas comprises the reactive H (atomic). The Applicants can not agree with the Examiner's statement and conclusion that a meta-stable H_3^+ plasma is *per se* formed when hydrogen gas is ionized. Applicants can agree that a reactive plasma consisting essentially of atomic H may have some trace species of H_3^+, but that such an embodiment would not be a meta-stable H_3 plasma. While ionizing hydrogen may contain some *de minimus* level of H_3^+ species, the Examiner's faulty reasoning is equivalent to concluding that an ice cube is a liquid, since one can find some amount of liquid water molecules in equilibrium with the solid ice.

Further, neither Dopper nor Wulff make an inherent disclosure of a meta-stable H_3^+ plasma or of conditions necessary to generate a meta-stable H_3^+ plasma. Despite the Examiners' allegation that one would have reasonably expected the generation of meta-stable H_3^+ plasma by Wulff, it would not be clear to a person of skill in this art that Wulff had ever generated, or described conditions sufficient to generate, a meta-stable H_3^+ plasma.

In addition, Applicants contend that there is no specific or sufficient motivation found in either Dopper or Wulff to combine these references to achieve Applicants' claimed invention. The process in Dopper of cleaning the metal surface before applying a coating, is a materially different process from the process of Wulff, to convert metal oxide powder to the pure molten metal. There is no motivation to consider Wulff, except to seek out a reference that alleges to provide the vacuum limitations in Applicants' claims that, the Examiner admits, distinguish Dopper.

The Examiner does not provide any specific or sufficient motivation in either Dopper or Wulff to select only the pressure conditions from Wulff, while ignoring electrical, magnetic, alternate gases, and other conditions. The Examiner is engaging in the impermissible practice of selecting specific features from a plurality of prior art references which, if cobbled together, are alleged to form Applicants' claimed invention, while ignoring other conditions and features which would render the invention inoperative. The Examiner can not use the Applicants' claimed invention as a blueprint for selecting features from the prior art to construct the claimed invention (see Interconnect Planning Corp. v. Feil, 774 F.2d 1132, 227 USPQ 543 (Fed. Cir. 1985) and In re Fine, 837 F.2d 1071, 5 USPQ2d. 1596 (Fed Cir. 1988)).

Even if, just for the sake of argument, the Dopper and Wulff references are to be combined, they do not in combination disclose or make obvious each limitation in the instant claims. Wulff teaches the reduction of powder titanium oxide to titanium metal as the powder passes through the wall of a magnetically-induced plasma tube. Wulff does not mention alloys, and particularly superalloy components. The alternative gases of Wulff, namely air and inert gas, can not provide a meta-stable H_3^+ plasma. Therefore, it is not obvious to use either the process, or the individual process conditions of Wulff, in combination with Dopper, to remove a metal oxide corrosion from a superalloy component using an H_3^+ plasma. In so far as Claim 15 is concerned, the alleged combination of Dopper and Wulff would not describe an H_3^+ plasma

formed by using a plasma torch. Further, neither Wulff nor Dopper teach or suggest using a mixture of hydrogen and inert gas.

For the reasons provided, Applicants content that the claims are patentable over the cited references. Applicants request reconsideration and withdrawal of the rejection, and allowance of these claims as amended.

b. Rejection of Claim 3 over Dopper in view of Wulff and Restall

The Examiner rejects Claim 3, directed to cracks in the substrate, is also rejected under 35 USC 103(a) over Dopper in view of Wulff, and further in view of Restall et al (4698130), which teaches that turbine blades incur damage by cracking, and the desire to remove oxide contaminants therefrom.

Applicants request reconsideration. Applicants contend that, as Claim 1 as amended is novel and unobvious over the prior art, then claim 3 dependent thereto is also patentable, whereby the rejection in view of Restall et al is rendered moot.

c. Rejection of Claim 12 over Dopper in view of Wulff and Cohen

Claim 12 has been rejected under 35 USC 103(a) as being obvious over Dopper in view of Wulff, and further in view of Cohen (US 2001/0050265). Cohen is alleged to teach removal of metal oxides from substrate surfaces using conventional process gases comprising 5% or less hydrogen premixed with an inert gas (para. 12). The Examiner concludes that it would have been obvious to a person of ordinary skill to modify the method of Dopper to include hydrogen with a concentration of less than 5%, premixed with inert gas, as taught by Cohen, to generate a plasma used in the reduction of metal oxide from substrate surfaces.

Applicants request reconsideration of the rejection in view of the amended claims and arguments that follow.

First, Applicants believe that this combination does not state a proper *prima facie* rejection of obviousness against the claimed invention. There is no motivation found in any of the references to combine Cohen with either Wulff or Dopper. There are dramatic differences in the processes taught in these references. Cohen teaches an etching chamber and method for removing metal oxides from integrated circuits, particularly copper and aluminum oxides, from a substrate. Dopper relates to cleaning and coating of alloy substrates. Wulff teaches converting

metal oxide powder to a pure metal. There are also differences in the type of metal oxide to be removed, the pressure and type of gas to use, and the type of material to be treated.

The Examiner does not provide any motivation to use only the particular gas of Cohen in the process of Dopper, but to use none of the other conditions. The only motivation can be the teaching provided by Applicants' description and claims. If the references were to be combined, where is the teaching in Dopper that only the gas mixture of Cohen should be used, and only the pressure conditions of Wulff should be used? The Examiner is engaging in the impermissible practice of selecting specific features from a plurality of prior art references which, if cobbled together, are alleged to form Applicants' claimed invention, while ignoring other conditions and features which would render the invention inoperative. The Examiner can not use the Applicants' claimed invention as a blueprint for selecting features from the prior art to construct the claimed invention (see Interconnect Planning Corp. v. Feil, 774 F.2d 1132, 227 USPQ 543 (Fed. Cir. 1985) and In re Fine, 837 F.2d 1071, 5 USPQ2d. 1596 (Fed Cir. 1988)).

For the reasons provided, Applicants content that the claim is patentable over the cited references, and request reconsideration and withdrawal of the rejection, and allowance of this claim as amended.

d. Rejection of Claim 14 over Dopper in view of Wulff and Restall and Venus

Claim 14 is also rejected under 35 USC 103(a) over Dopper in view of Wulff and Cohen (US 2001/0050265), and further in view of Venus (3851136). Venus is alleged to teach generating a plasma through a magnetic channel for purposes of accelerating the electrons used in the reduction of metal oxides. The Examiner concludes that it would have been within the level of the skilled artisan to have modify the method of Dopper to include a magnetic field channel, as taught by Venus, for purposes of transmitting the flow of electrons within the plasma for use in the reduction of metal oxides.

Applicants request reconsideration of the rejection, in view of the amended claims and arguments presented herein above. Applicants note that Venus and Wulff have substantially the same description. Venus differs in the use of a halogen gas to form metal halides (see Col. 6 line 44-Col 8, line 9).

For the reasons provided, Applicants content that the claim is patentable over the cited references, and request reconsideration and withdrawal of the rejection, and allowance of this claim as amended.

4. Applicants' Further Comments and Responses to Examiner's Response

Applicants have noted Examiner's comment that Applicants' arguments on the patentability of the claims over Dopper in view of Wulff are unpersuasive since they are not commensurate with the limitations of Claim 1 which did not recite the specific pressure conditions. Applicants disagree with the Examiner's opinion and rationale. Applicants contend that the Claim 1 limitation of generating a meta-stable H_3^+ plasma clearly distinguishes the prior art of Dopper, alone and in view of Wulff, as discussed herein. The lack of conditions recited in Claim 1 is not relevant to the persuasiveness of the argument. Applicants' description in support of claims provides conditions sufficient to teach a person of ordinary skill to form an H_3^+ meta-stable plasma. The Examiner has not raised any objection or rejection to Claim 1 under 35 USC 112. At issue is instead whether the prior art describes or suggests a meta-stable H_3^+ plasma for use in reduction metal oxide corrosion from a superalloy component of a gas turbine engine. Applicants state that the prior art does not.

5. Conclusion

Applicants believe it has provided a complete response to the office action, and that the present invention as claimed clearly distinguishes the teachings of the prior art of record. Applicants request a prompt allowance of all claims.

Respectfully submitted,

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